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DISEASES OF DENT CORN IN INDIANA

Purdue University
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Research Administration
U. S. Department of Agriculture
Washington, D. C.

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EACH year the corn crop of Indiana suffers some loss due to one or more diseases. This loss varies from season to season, area to area, and even from field to field in the same community. Eliminating or reducing this loss will mean greater return from corn acres, and more food and feed for domestic and foreign consumption.

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Diseases of Dent Corn in Indiana

ARNOLD J. ULLSTRUP[1]

Factors Affecting the Development of Corn Diseases

Fluctuations seen in the prevalence and severity of corn diseases are due to three factors, —(1) the environment (weather and soil conditions); (2) the relative susceptibility of the hybrid; and (3) the presence or absence of the disease-producing agents (fungi or bacteria).

The Environment: Most diseases of corn develop best when there is an abundance of moisture during the growing season. Moisture either as rain or dew permits the spores of disease-producing fungi to germinate and grow and attack the plant. Some diseases such as seedling blights are favored by low soil temperatures after planting.

Soil fertility is another environmental factor determining the severity of such diseases as diplodia stalk rot. Soils maintained at high productive levels produce strong plants that make full use of the entire growing season. Some diseases, however, do not appear to be influenced to any great extent by soil fertility, but since yield is the most important consideration in growing corn it is only reasonable that every effort should be made to build up and maintain soils at their maximum productive capacity.

The Hybrid: Wide differences exist among hybrids in their ability to resist diseases. Some are highly resistant to some diseases and susceptible to others. Resistance or susceptibility in corn is determined by hereditary factors. The corn breeder is able to modify the heredity (genetic constitution) of the component inbreds of a hybrid and thus produce hybrids having resistance to diseases among other desirable characters.

The Disease-Producing Agent: The presence or absence of the disease-producing agent is the third factor influencing the prevalence of disease. Every infectious disease of corn in Indiana is caused by a specific fungus, (some of which are referred to as molds), or bacterium. In some localities certain diseases are unknown because the particular disease organisms are absent. Under such circumstances those diseases will not occur even though the corn is susceptible and environmental conditions are favorable.

Fungi are low forms of plant life. Some, as those producing diseases, are parasites and feed on living material; while others, (saprophytes), live only on dead material such as plant refuse. Most fungi are spread about by spores which correspond in many ways to the seeds of ordinary higher plants. In the presence of moisture these spores germinate and, in the case of those that are parasites, grow into the living plant. Fungi, or bacteria may enter corn plants through wounds, insect punctures, or directly through the plant cells.

[1] Associate Pathologist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Agricultural Research Administration U. S. Department of Agriculture.

Control of Corn Diseases

The use of resistant hybrids is the best means of controlling corn diseases. Unfortunately, no single hybrid has high resistance to all diseases, yet reasonable resistance to most of the more important diseases can be obtained in high yielding corn. Much work remains in breeding out susceptibility to certain diseases in inbreds of high yield capacity.

In general, the resistance of a hybrid to any disease is proportional to the number of resistant inbreds that were combined to make the hybrid. If four inbreds resistant to a disease are combined to make a hybrid, that hybrid will be highly resistant to the disease. On the other hand, if three of the four inbreds used in a hybrid are susceptible to the disease, the hybrid is likely to be quite susceptible. In some cases dominance of resistance, or susceptibility to a disease or interaction of genetic factors, may complicate this general relation.

A soil in which the fertility is properly balanced is an important factor in the control of certain corn diseases. This involves the use of recommended rotations, the maintenance of adequate amounts of organic matter in the soil, and the use of fertilizers and lime when these are needed.

Seed treatment is an economical insurance against seedling diseases. However, seedling blights are the only disease of corn subject to control by fungicidal dust treatment, and such treatment should not be substituted for sound seed. The first consideration in the control of seedling diseases is the use of sound healthy seed of high germination, and free from excessive mechanical injury. The seed corn producer plays an important part in the production of high quality seed. Proper processing methods, including rapid drying at recommended temperatures, removal of diseased and cracked kernels, proper grading, and treating are important factors to be considered in the production of good sound seed.

Description of Corn Diseases

Seedling Blight

The prevalence of seedling blight varies from year to year depending on soil temperatures during and immediately following planting. In seasons when the soil remains cold and wet following planting seedling blight is most prevalent.

Symptoms: Seedlings that are attacked may be completely killed before the sprout emerges from the soil (Fig. 1) or they may blight off after emergence. Seedlings surviving attack usually produce weakened and retarded plants. Such seedlings when dug from the soil will show brownish rotted areas on the sprouts near the seed.

Causal Agent: Any of the ear rot producing fungi are capable of causing seedling blight but in Indiana seedling blight caused by ***Diplodia zeae*** is most common. Infection usually comes from the diseased kernel although seedlings may be attacked by this fungus living in the soil.

Control: Most important in the control of seedling blight is the use

Figure 1. Seedling Blight
Various degrees of seedling blight from complete killing before emergence to very slight infection.

of sound, healthy seed that has a minimum of cracked or injured seed coats. Planting should be delayed until (a) serious danger of cold wet weather is largely past. Seed treatment with a standard fungicidal dust* while usually showing no benefit on healthy seed planted in warm soil is none the less a cheap insurance against poor stands if unfavorable weather prevails after planting. To be most effective, seed treatments should be applied exactly as recommended by the manufacturer.

* For more specific information regarding fungicidal treatment of seed corn inquiries may be directed to the Department of Botany of the Purdue University Agricultural Experiment Station.

STALK ROTS

Diplodia Stalk Rot

This disease is found in Indiana every year to some extent, and is responsible for premature dying and stalk breaking. It is most severe in

wet seasons when premature dying of plants can be seen as early as the middle of August. Broken stalks not only make harvesting difficult, but also allow the ears to come in contact with the soil where they are overtaken by rot.

Symptoms: Affected plants suddenly show a wilted appearance similar to frost injury. Plants thus affected with the disease stand out in sharp contrast to the bright green healthy plants in the field. When such plants are examined they show a brownish discoloration at the lower part of the stalk together with a softening of the tissues. As the disease progresses the pith is destroyed leaving only the strands of the water conducting vessels within the partly hollow stalk (Fig. 2). Plants affected as early as the middle of August produce chaffy ears and the stalk usually breaks over before harvest.

Causal Agent: Diplodia stalk rot is a fungous disease caused by ***Diplodia zeae.*** The fungus enters the plant at the base or one of the lower nodes of the stalk. The disease-producing fungus lives over from one season to another on old stalks in the field and on the seed. At the time of harvest or by the following spring the spore-containing sacks of the fungus, which appear as small black specks may be seen partially embedded on the outer surface of the stalk (Fig. 2C). During warm wet weather the spores in these sacks ooze out and are blown about by wind currents. The spores become

Figure 2. Diplodia Stalk Rot

(A) External appearance of a healthy corn stalk and a stalk infected with diplodia stalk rot. The healthy stalk (left) is green and solid; the diseased stalk (right) is bleached, brown, and broken. (B) Split halves of a healthy stalk and a stalk infected with diplodia stalk rot. Note the solid white pith of the healthy stalk and the discolored and shredded pith in the diseased stalk. (C) Diplodia infected stalk showing spore sacks of the fungus (indicated by arrows). From these spore sacks the disease-producing spores are ejected in the summer to cause infection on ears and stalks.

lodged between husks and behind leaf sheaths and grow into the plant.

Control: One means of controlling this disease is through use of hybrids that make full use of the entire growing season. Hybrids that mature early in relation to the growing season are more susceptible to attack than those that mature later. Marked differences in resistance exist among the inbred lines used in Indiana. Where this disease is a problem, hybrids made up of especially susceptible inbreds should be avoided. The relative resistance of inbred lines to this disease is given on page 20.

Soil fertility appears to have an important influence on this disease. Soils low in potash and nitrogen tend to produce corn showing more stalk rot than soils of well balanced fertility. Since this disease becomes established in the plant as maturity approaches, practices such as additions of potash or nitrogen to the soil tend to keep the stalk green and functioning for the entire season and allow the plant to escape the disease.

Corn that has been weakened by attacks of chinch bugs, grasshoppers, or leaf diseases is rendered more susceptible to this disease.

Gibberella Stalk Rot

This disease is occasionally found in Indiana but generally it is of little consequence.

Symptoms: The symptoms of this disease are very similar to those caused by diplodia stalk rot with the exception that the interior of the stalk becomes reddish in color.

Causal Agent: The fungus ***Gibberella zeae (Gibberella saubinetii)*** is the cause of this disease. It lives over on dead corn stalks in the field. In the following spring and summer the spore sacks, which are larger than those of ***Diplodia zeae,*** are seen as black specks on the surface of the old stalks (Fig. 5C).

Control: The control of this disease is the same as that recommended for diplodia stalk rot.

Bacterial Stalk Rot

This stalk rot is seen only occasionally in Indiana and almost exclusively in wet seasons. It is found more frequently in the southern part of the state and where fields of young corn have been flooded.

Symptoms: The rotting is confined to a small area near the base of the plant and seldom progresses for any distance up or down the stalk. The rotted area is discolored and soft and the stalk soon breaks over at this point.

Causal Agent: The disease is caused by ***Phytomonas dissolvens,*** a bacterium that is apparently able to live in the soil and on old diseased stalks.

Control: Since this disease is of so little importance in Indiana no investigations have been conducted to determine methods of control. Inasmuch as corn is the only plant attacked rotation would be a recommended practice where the disease occurs.

EAR ROTS

Diplodia Ear Rot

Of the several ear rots known to occur in Indiana, diplodia ear rot, or dry rot, is the most prevalent and causes the most damage. In some seasons, particularly those with excessive moisture the disease can be found as early as the middle of August.

Symptoms: Husks of ears affected early appear bleached in contrast to the green husks of healthy ears. When infection takes place early the entire ear is rotted and appears grayish brown and shrunken by harvest time (Fig. 3B). Ears infected somewhat later are covered with a whitish mold. Ears that are infected still later in the season may show no signs of disease until the ear is broken or the kernels are removed (Fig. 3C). Mold will then be seen between the kernels and the tips of the latter will be discolored. Infection usually begins at the base of the ear, but sometimes it may be found commencing at the tip.

Causal Agent: Diplodia ear rot is caused by the same fungus, ***Diplodia zeae,*** as causes diplodia stalk rot and has already been discussed in the section on diplodia stalk rot.

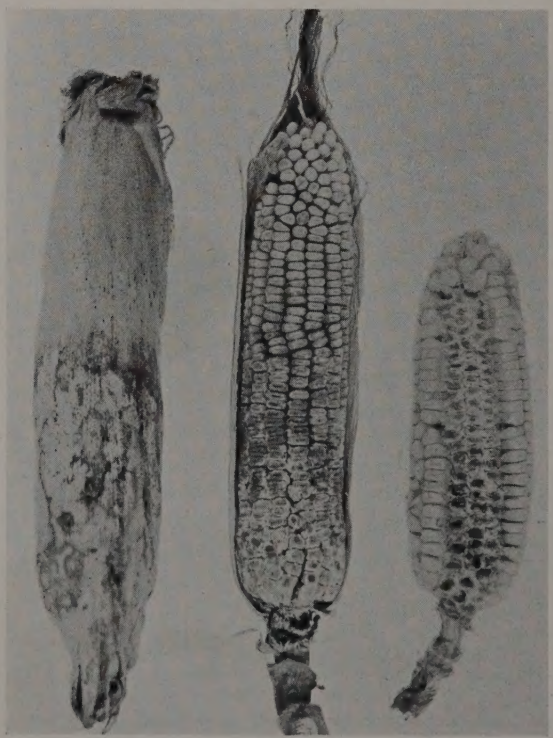

Figure 3. Diplodia Ear Rot

Ear at left shows external appearance of rotted ear. Husks are moldy, discolored and "cemented" together. Ear in center shows typical infection. Note tht infection came in from the rotted shank. The ear on the extreme right shows infection progressing from shank up between kernels. This type of mild infection is often overlooked unless ear is broken or shelled.

Control: Although all corn is somewhat susceptible, there are nevertheless differences among inbred lines with respect to resistance to this disease. The best means of controlling the disease is to avoid using hybrids made up from highly susceptible inbred lines. A list of resistant and susceptible inbred lines to this disease is given on Page 20. Seed treatment has no controlling effect on this disease.

Fusarium Ear Rot

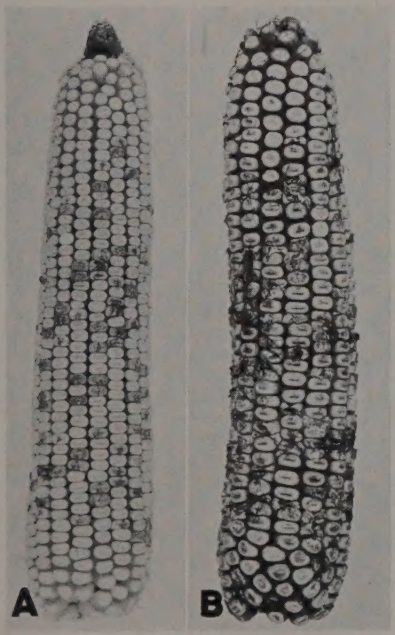

Figure 4. Fusarium or Pink Rot
(A) Ear showing early infection. The kernels show a slight pinkish coloration. (B) Ear showing a more advanced stage of the disease. The fungus has developed further and powdery pink spore masses cover the infected kernels.

This disease, sometimes known as pink ear rot, can be found every year, but it is not as destructive as diplodia ear rot.

Symptoms: The first symptom of this disease is a pink coloration on the caps of individual kernels or groups of kernels scattered over the ear (Fig. 4A). Later as the disease progresses the infected kernels become powdery pink due to further growth of the fungus, (Fig. 4B). The disease is often seen spreading from the points where ear worms have entered the ear.

Causal Agent: The disease is caused by ***Gibberella fujikuroi (Fusarium moniliforme)*** a fungus which lives over winter on rotted ears and other plant refuse and in the soil.

Control: To control this ear rot, hybrids with poor husk covering and those showing tendencies toward "popped kernels" or "silk cut" should not be used where this disease is considered important.

Gibberella Ear Rot

This ear rot is occasionally seen in Indiana, especially in wet seasons. Seldom, however, is the disease responsible for any appreciable damage.

Symptoms: The symptoms are readly recognized by the brick-red color of the mold which usually enters the tip and progresses toward the butt of the ear. The husks are usually reddish pink and cemented together due to the mold growth between them (Fig. 5).

Causal Agent: This disease is caused by the same fungus, ***(Gibberella zeae (Gibberella saubinetii),*** responsible for gibberella stalk rot. The principal points in its life history are discussed under the section devoted to gibberella stalk rot.

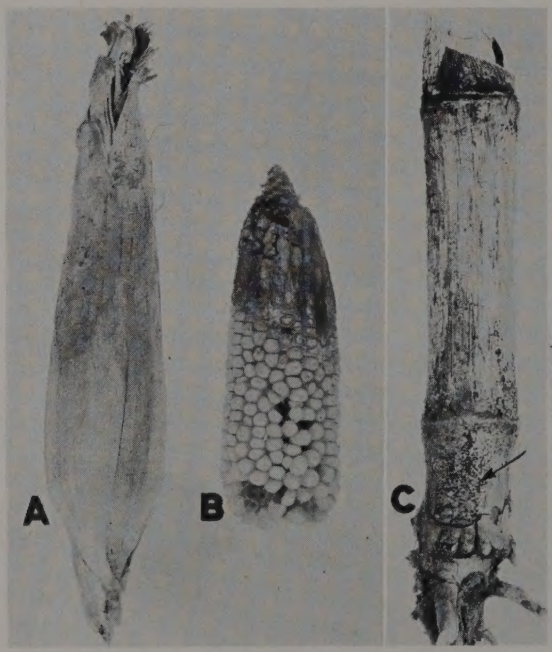

Figure 5. Gibberella Ear Rot (A) The husks are pink toward the tip and may show mol dgrowth. (B) Typical ear infection. The diseased portion is brick-red in color and part of husks and silks may adhere to the kernels. Note that infection starts at the tip of the ear. (C) Spore sacks of the fungus (indicated by arrows). In the spring and summer these structures eject the disease producing spores.

Nigrospora Ear Rot

This disease sometimes known as cob rot occurs to some extent each year in Indiana. It is found to be more prevalent on corn in which growth has been suddenly stopped by root injury, cold, or stalk rot.

Symptoms: Affected ears are light in weight, kernels are somewhat bleached and chaffy and can be easily pressed into the cob. Shanks of such ears have a shredded appearance which often extends the full length of the cob (Fig. 6). When the ear is broken the cob shows a dry rot with small black specks scattered through the shredded pith. The tips of the kernels also show these masses of black specks which are groups of spores.

Causal Agent: The disease is caused by a fungus, ***Nigrospora sphaerica (Basisporium gallarum),*** which overwinters on plant refuse in the field. Infected kernels, if planted in cold wet soil so that considerable time elapses before germination commences, will often be killed by continued growth of the fungus into the embryo.

Control: No specific control measures have been worked out for this disease.

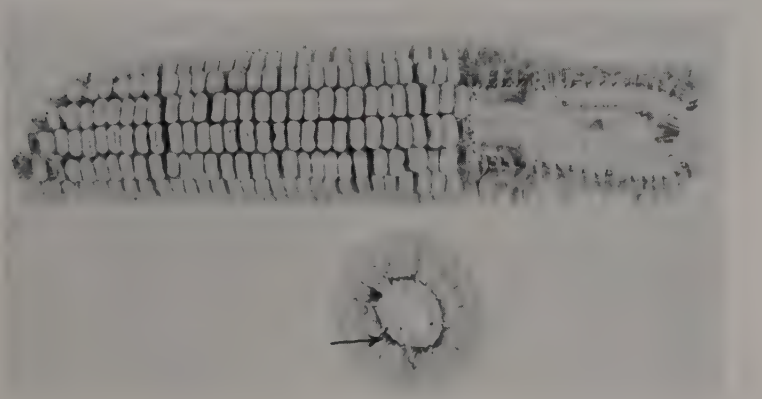

Figure 6. Nigrospora Ear Rot

The ear is spongy and kernels are somewhat bleached. The cob is shredded and black spore masses can be seen near the base of the kernels, as indicated by arrow.

Penicillium Ear Rot

This ear rot can be found in most years, but ordinarily it is of little economic importance. Inbred ears are generally more readily attacked than hybrid ears.

Symptoms: The symptoms of this disease are quite distinct, appearing as a greenish blue powdery mold on and between the kernels. (Fig. 7.) The mold often gains entrance to the kernels through ear worn injuries.

Causal Agent: The disease may be caused by any one of several species of ***Penicillium*** which are of widespread occurrence.

Control: No control measures have been worked out for this disease. Diseased kernels should be removed from seed corn since they produce weak blighted seedlings.

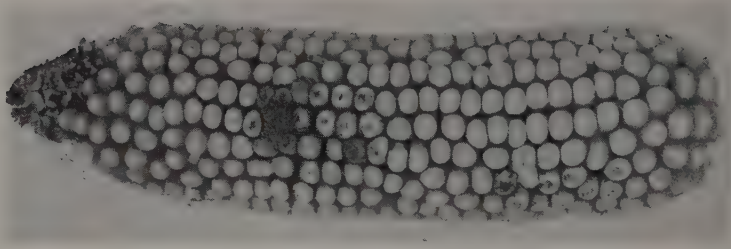

Figure 7. Penicillium Ear Rot

Green powdery moldy spots on the ear are typical of this disease. It is more prevalent on inbred ears than on single or double crosses. The infection is frequently brought in by ear worms.

Aspergillus Ear Rot

This ear rot is occasionally seen in Indiana especially on inbred ears.

Symptoms: The most distinguishing feature of the disease is the small clustered heads of a black mold on the kernels. Like Penicillium ear rot this disease usually gains entrance to the ear through ear worm injuries.

Causal Agent: This ear rot may be caused by any one of several species of ***Aspergillus,*** which are widely distributed.

Control: No control for the disease is known. Diseased kernels should be removed from seed corn since they are apt to produce blighted seedlings.

Storage Rots

Storage Rot

Storage rots may develop on either shelled corn or ear corn if moisture and temperature conditions are favorable for fungous growth.

Symptoms: One of the most conspicious storage rots is that known as "blue-eye" (Fig. 8A). The germ is bluish green in color due to masses of spores of the fungus. The germ is completely destroyed and is undesirable for feed.

Causal Agent: "Blue-eye" may be caused by any one of several species of ***Penicillium.*** Any of the ear rot fungi, however, may continue to develop on corn stored at temperatures and moisture contents that permit growth of these fungi.

Control: Shelled corn may be safely stored in a tight bin if the moisture content is 14 percent or less. Ear corn stored in a ventilated crib is ordinarily in no danger from storage rots if the moisture content is below 25 percent. In either case temperature is an important factor and stored corn with initial moisture contents somewhat higher than the values given above may be safe through winter months.

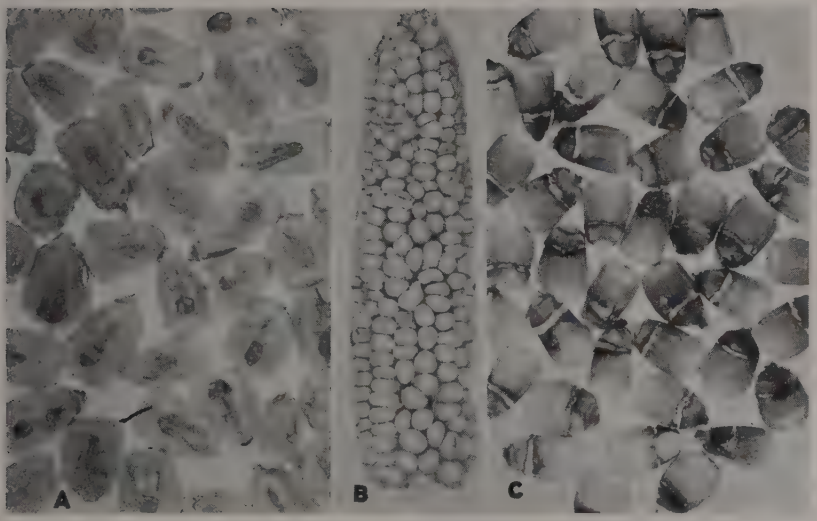

Figure 8. Storage Rot and Kernel Disorders

(A) "Blue-eye" disease of stored grain. Bluish green spore masses are formed in the germ beneath the seed coat. This condition is seen when corn is stored before it is sufficiently dry.

(B) "Popped Kernel." This condition is not brought on by hot weather. It seems to be characteristic of certain lines to break their seed coats when the kernel is expanding during growth.

(C) "Silk-cut." This disorder is not associated with the silks but is due to a weak seed coat that cracks in this manner when the kernel grows and expands.

KERNEL DISORDERS

Kernel disorders, properly speaking, are not diseases, but because they provide opportunities for fungi to rot the kernels they bear close relation to corn diseases.

"Popped kernel" is a kernel disorder appearing as an irregular break in the seed coat over the crown of the kernel (Fig. 8B). The kernels look like partially expanded popcorn kernels.

"Silk-cut" appears as a horizontal cut or split in the seed coat over the sides of the kernel (Fig. 8C). This condition has nothing to do with the silk of the ear. Like "popped kernel" this condition is sometimes associated with certain hybrids.

These disorders are caused by weak seed coats which apparently are unable to accommodate expansion as the kernel develops and consequently break at the weakest point.

LEAF DISEASES

Helminthosporium Leaf Blight

This disease is very destructive in seasons when there is an abundance of rainfall. In 1942 the disease was particularly severe and prevalent, and could be found in most corn fields of the state by the latter part of August. The eastern and southeastern sections of Indiana experienced the greatest amount of disease and it was in these areas that the epidemic caused reductions in yield.

Symptoms: The symptoms consist of long, elliptical spots on the leaves (Fig. 9A). The spots are light brown in color and show a faint target-like pattern of concentric rings. Black, powdery spore masses are formed over these spots, especially on the lower surface of the leaves. These spots first appear on the lower leaves, but with continued moist weather they increase in size and number until

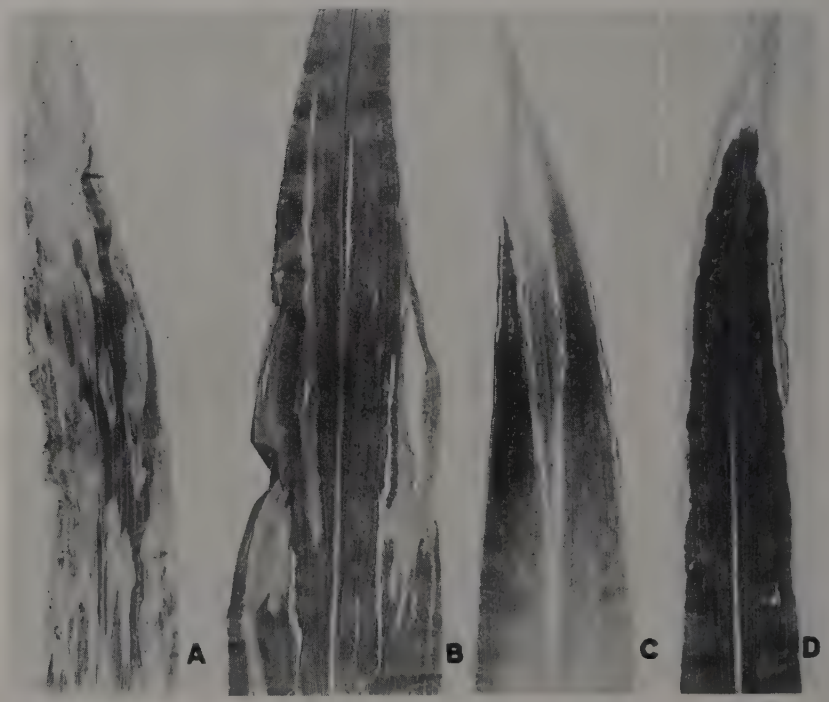

Figure 9. Leaf Diseases and Deficiency Symptoms

(A) Severe infection of Helminthosporium leaf blight. Note that little green tissue remains. Observe the target-like effect on the spot at (S) and the spore masses in other spots at (M). (B) Leaf infection by Stewart's disease. These spots are long and irregular and follow the veins. (C) Nitrogen deficiency. Note V-shaped dead area following down midrib. (D) Potash deficiency. Note dying along edges of leaf. Contrast (A) and (B) with (C) and (D).

every leaf on the plant is covered with them. Fields that are heavily attacked appear as though fired or injured by frost. In Indiana the disease usually makes it first appearance about the middle of August. When infection occurs this early and progresses rapidly so that by the first of September one-half or more of the leaves are dead, reductions in yield are to be expected and the stalk become more susceptible to rot.

The most important factor determining the occurrence of the disease is the abundance of rainfall and heavy dews during the growing season. The occurrence of the disease seems to be little affected by soil type or fertility. Early planted corn is the first to be attacked by the disease. This is because early planted fields usually are approaching maturity and therefore more susceptible when the disease appears. Late planted corn may escape the disease if, as it comes to maturity, the weather is dry. If favorable weather conditions prevail, however, late corn, too, will suffer when it approaches its most susceptible stage.

Causal Agent: Helminthosporium leaf blight is a fungous disease caused by ***Helminthosporium turcicum.*** The spores by which the fungus is spread may live over winter on dead corn leaves in the field.

Control: The most effective means of control is through the use of resistant hybrids. A list of resistant and susceptible inbred lines is given on page —. So far as is known there is little danger of effective spread of the disease from infected seeds.

Helminthosporium Leaf Spot

This disease is distinguished from Helminthosporium leaf blight in that symptoms are different and in Indiana so far, only inbred lines are known to be attacked.

Symptoms: On the inbred line Pr the symptoms appear as small, oval spots on the leaves (Fig. 10A). On the husks and leaf sheathes the spots are larger and become covered with sooty spore masses. All parts of the plant are susceptible to attack and in advanced stages of the disease the ears are attacked. The ear rot is recognized as a black mold covering the husks and kernels which give the ear an appearance of being charred (Fig. 10B).

The symptoms on the leaves of certain proprietary inbred lines appear as small, elongated, irregular spots that are chocolate brown in color. The ear rot on all inbred lines is the same in appearance and as described above. The inbred 187-2 seems to be quite susceptible to the ear rot phase of the disease, but has little leaf infection. Like Helminthosporium leaf blight this disease becomes severe when the weather is unusually moist.

Causal Agent: The disease on inbred Pr is caused by ***Helminthosporium maydis*** Race I. The disease on inbred 187-2 and some proprietary lines is caused by ***H. maydis*** Race II. The distinction between the two races is based on differences in symptoms produced and the inbred lines susceptible to the respective races.

The fungus lives over winter on old leaves in the field and on seed.

Control: The best means of controlling the disease in the inbred line

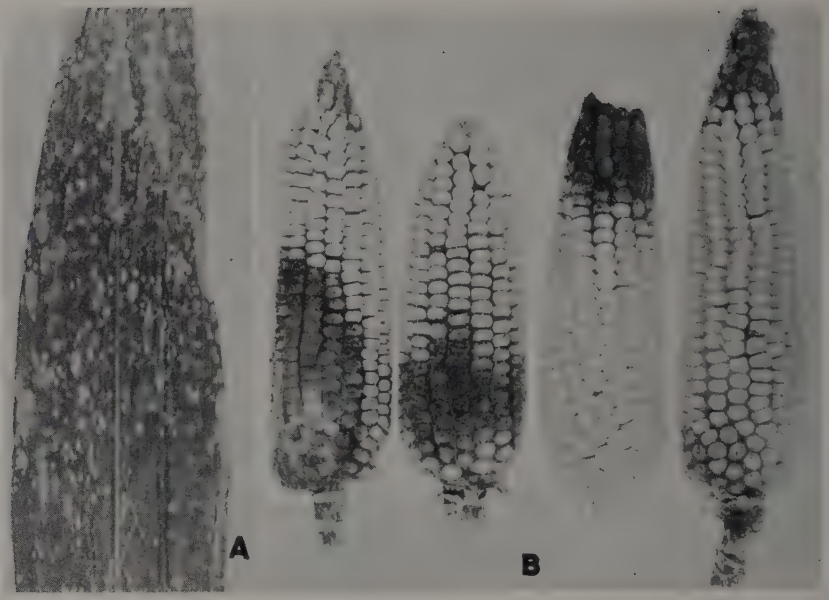

Figure 10. Helminthosporium leaf spot on Inbred Pr.
(A) Symptoms on leaf of inbred Pr. (B) Symptoms on ears of inbred Pr.

Pr is by breeding out the susceptibility to the disease. It has been shown that susceptibility to the disease in the inbred line Pr is covered up, or recessive, in single and double crosses and thus it has been possible to breed out susceptibility quite rapidly. In most other inbred lines which are attacked by Race II the disease is usually not severe and extensive control measures have not been worked out. Thorough culling of diseased seed will aid in preventing spread of the disease to new localities.

Bacterial Wilt or Stewart's Disease

This disease is primarily one of sweet corn but occasionally dent corn is heavily attacked. On dent corn the so-called late infection stage on the leaves may cause considerable damage in some seasons.

Symptoms: The symptoms of the late infection stage on dent corn appear as long, irregular lesions that tend to follow the veins of the leaves (Fig. 9B). The spots or lesions first appear light green or yellowish in color. As the spots become broader the central areas die, become brown in color, and dry and shatter. The edges of the spots are usually yellowish; this is especially noticeable when the leaf is held against strong light. The spots may become so numerous that little green leaf area remains. Under such severe infection yield is reduced and the plant becomes susceptible to stalk rot. On

careful examination flea beetle feeding marks will be seen associated with every spot. These feeding marks appear as fine irregular scratches or etchings that are particularly distinct when the leaf is held to the light.

Causal Agent: The disease is caused by a bacterium, ***Phytomonas stewarti,*** that lives over winter in the bodies of hibernating flea beetles. When these insects become active in the spring and summer they spread the disease with their contaminated mouth parts. It is for this reason that the lesions are almost invariably associated with the feeding marks of the beetle.

Control: This disease seems to be best controlled through the use of resistant hybrids. With few exceptions hybrids made up of inbreds resistant to Helminthosporium leaf blight are also resistant to late infection of Stewart's Wilt. Since the disease in dent corn is confined to the leaves there is little danger of spreading it through infected seed.

Corn Rust

Corn rust, while it is present every year is of little importance in Indiana.

Symptoms: The symptoms are seen on the leaves as small powdery, rust colored spots or pustules (Fig. 11).

Causal Agent: The disease is caused by ***Puccinia sorghi.*** In Indiana this fungus overwinters on diseased leaves in the field.

Control: Because the disease is of little importance in Indiana no efforts have been made to control it.

Purple Sheath Spot

No corn field in Indiana is without some of this disease during the growing season. Some hybrids tend to show more of it than others.

Symptoms: The disease is recognized by irregular purplish blotches on the leaf sheaths.

Causal Agent: The spots are caused by several species of fungi and bacteria that become lodged between the stalk and leaf sheath where they grow and cause slight infections on the inner surface of the sheath. (Fig. 12.)

Control: The disease is of no importance and consequently no control measures seem necessary.

CORN SMUT

Corn smut, because of its conspicuous symptoms, is probably the best known disease of corn. Losses from smut vary from year to year depending to a considerable extent on environmental factors. In dry years smut appears to be more abundant than in years when growing conditions are more favorable for corn. Corn grown on soil particularly

Figure 11. Corn Rust

Corn leaf infected with rust. Note the rusty pustules breaking through epidermis of the leaf.

Figure 12. Purple Sheath Spot

This disease is seen in practically every corn field in the late summer. It does not cause damage to the crop.

high in nitrogen and organic matter frequently shows more smut than corn grown on a soil well balanced in fertility. Hail damage or mechanical injuries from cultivation increase smut infection. Failure of pollination favors the development of smut on the ear shoots.

Figure 13. Corn Smut

(A) Smut destroyed the entire ear. (B) Tassel smut. Any part of the corn plant is susceptible to attack by this disease.

Symptoms: Smut infections occur on any above ground portions of the plant and first appear as white glistening galls or knobs. The interior of the galls gradually become powdery black and finally the entire gall is a mass of sooty spores (Fig. 13). Smut may attack and destroy the entire ear; it may reduce the size of the ear; or it may cause complete barrenness. Usually galls on or above the ear are more destructive than those below the ear. The amount of damage depends therefore on the location and size of the galls. Smut galls resulting from detasseling are usually small and generally cause little damage.

Causal Agent: The disease is caused by a fungus, ***Ustilago zeae-mays*** that lives over winter as spores in old smut galls or in the soil.

Control: Control of smut may be practiced by maintaining uniform growth of the corn throughout the season so far as possible. This may be accomplished in part by maintaining well balanced soil fertility. Some of the inbred lines and their hybrids have some tendency to smut susceptibility. These lines, however, are widely used because of other characteristics that are highly desirable and when used in combination with more resistant inbreds have given satisfactory performance.

Reaction of Inbred Lines of Dent Corn Used in the Indiana Certification Program to the More Important Diseases

Resistant	*Intermediate*	*Susceptible*
	Diplodia Stalk Rot	
38-11	90 I234	540 187-2
Wf9	66 K4	R4 Tr
Hy	M14 Ldg	A 4-8
Pr	L L317	
	Diplodia Ear Rot	
R4 540	38-11 A	Tr K4
90	L317 Pr	4-8 M14
Wf9 66	Ldg L	Hy I234
	187-2	
	Helminthosporium Leaf Blight	
L317	M14 H22	66 R4
K4	90 I234	187-2 Hy
Pr[1]	38-11 Ldg	Tr Wf9
K6	33-16 H5	540 L
H23	H21	A
	Smut	
33-16	Hy 540 Pr	Tr
L317	4-8 L I234	38-11
K4	90 Ldg Wf9	187-2
K4	M14 H5 66	
	A	

[1] Very susceptible to *Helminthosporium maydis* Race I.